

August 16, 2016

**Ex parte**

Edward Smith  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

*Re: Office of Engineering and Technology and Wireless Telecommunications Bureau Seek  
Information on Current Trends in LTE-U and LAA Technology, ET Docket No. 15-105*

Dear Mr. Smith:

Broadcom, Hewlett-Packard Enterprise, and Microsoft sent the attached letter to the Wi-Fi Alliance (WFA) on August 15, 2016, concerning WFA's development of a Wi-Fi/LTE-U coexistence test. I am submitting this letter for your consideration as part of record in the above-referenced proceeding. Please contact me if you have any questions.

Sincerely,

Christopher Szymanski  
*Director, Product Marketing &  
Government Affairs  
Broadcom*

CC: Julius Knapp  
Ira Keltz

Enc.

August 15, 2016

Edgar Figueroa,  
Chief Executive Officer,  
Wi-Fi Alliance  
10900-B Stonelake Boulevard, Suite 126  
Austin, Texas 78759 U.S.A.

**Re: BROADCOM, HEWLETT PACKARD ENTERPRISE (HPE), AND MICROSOFT STATEMENT  
IN SUPPORT OF WI-FI ALLIANCE COEXISTENCE TEST PROGRAM**

Microsoft, Hewlett-Packard Enterprise (HPE) and Broadcom, are heartened to see the progress the Wi-Fi Alliance (WFA) has made in developing a Coexistence Test Plan for new, non-standards based LTE technologies that wish to fairly share unlicensed spectrum with Wi-Fi. These three companies – all founding WFA members - took part in WFA's fifth public workshop on the subject held in San Jose, CA last week. Given the importance of this issue, we are encouraged by both the integrity and speed of the Test Plan, which is on track to be completed in September and will be rolled out almost twice as fast as any other program in the history of WFA.

In making the final decisions about the test plan design, Microsoft, HPE and Broadcom encourage WFA to resist continued attempts to change the test plan in a manner which would undermine the longstanding agreement between the cellular and Wi-Fi industries that an unlicensed LTE base station should cause no more impact to existing Wi-Fi networks than adding another Wi-Fi network. This simple standard, which has been publicly agreed by all parties for well over a year, should apply equally to a wide variety of usage scenarios.

While we recognize that the nearly completed test plan is not perfect, we endorse the plan. One ongoing concern relates to test levels, which are significantly stronger signal levels than operating capabilities of most Wi-Fi clients. Many consumer electronic devices, such as set top boxes, game consoles, and DVD players, are typically installed behind TVs or cabinets, where the Wi-Fi signal is much weaker than what is typically received at the center of the room. In many instances these devices are adjacent to exterior walls, and would be greatly impacted by LTE-U transmissions in adjacent buildings, apartments, or even outdoors. In other words, under the current test plan hundreds of millions of Wi-Fi devices operating today would be ignored by LTE-U equipment while it is calculating how to share fairly. Despite these concerns, we believe that the nearly completed test plan represents a pragmatic and significant compromise between competing viewpoints on a range of matters.

As we have said throughout the testing process, a coexistence validation test for unlicensed LTE must ensure that this new technology does not undermine the Wi-Fi devices used by hundreds of millions of consumers around the globe. The testing criteria must ensure fairness to more than high-end enterprise deployments; it must consider impact to a broad range of consumers and clients, including local, state and federal government agencies, retailers, manufacturers, public hotspots, personal hotspots, and consumers in their homes.

Wi-Fi's ability to operate at moderate signal levels is one of the key reasons for its success, enabling an incredible number of simultaneous users to take advantage of the technology. This fact has been well known to the cellular industry since all sides agreed to the fairness standard. It is both fair and reasonable to insist on testing coexistence in deployments that permit that consumers can continue to benefit from this core aspect of Wi-Fi. Continued pressure to exclude lower signal level testing would undermine the validity of the testing process and may be an indication that LTE-U Forum members are having difficulty fulfilling their promise of fairness in a number of real-world scenarios using the methods they have chosen, and now seek to only protect high-end Wi-Fi devices used in enterprise deployments.

On a related note, for its part Microsoft continues to be concerned that there is still no clear understanding about how various unlicensed LTE devices will choose their duty cycle. Microsoft has been involved in cognitive radio research for over a decade, and we are skeptical of the notion that unlicensed LTE equipment can garner enough information to operate fairly based on the amount of energy it receives. To the best of our knowledge, the use of received energy to decide the impact of a radio's transmissions on an unknown number of neighbors is still an open question in research.

Even with serious reservations regarding the ability of unlicensed LTE-technologies to coexist fairly with real-world 5 GHz Wi-Fi deployments, Microsoft, HPE, and Broadcom recognize WFA's 17-year history of designing & delivering effective certification testing programs for increasingly complex wireless technologies; we believe that the WFA Coexistence Test Plan process has been fact-based, conducted professionally, and that WFA is the right organization to do this work.

Sincerely,

*/s/ Christopher Szymanski*  
Christopher Szymanski  
Director, Product Marketing  
& Government Affairs  
Broadcom

*/s/ Chuck Lukaszewski*  
Chuck Lukaszewski  
VP, Wireless Strategy  
& Standards  
Hewlett-Packard Enterprise

*/s/ Paul Mitchell*  
Paul Mitchell  
Senior Director, Technology  
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